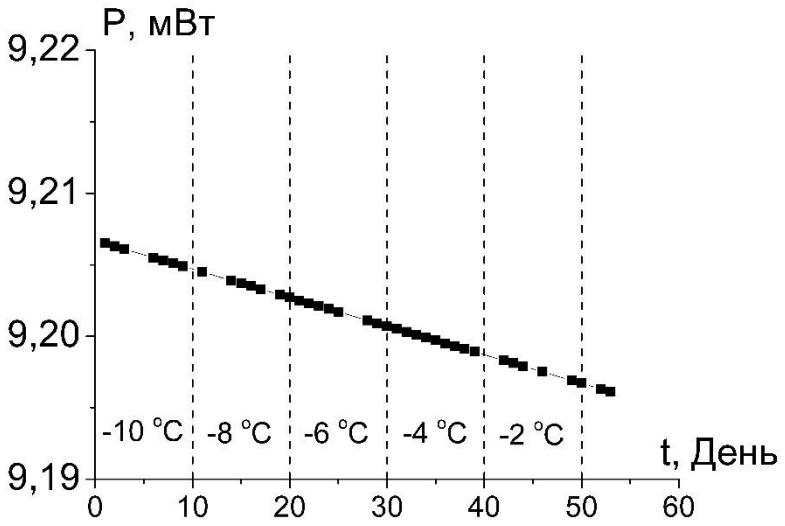

Рис. 1. Временная зависимость мощности теплового потока, выделившейся из образца

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SPECTRAL-LUMINESCENT PROPERTIES OF GD_2O_3:ER - BASED MATERIALS FOR SOLAR ENERGY CONVERSION

Kuznetsova Yu. A.[1*], Zatsepin A. F.[1], Spallino L.[1, 2]

[1)] Ural Federal University, Yekaterinburg, Russia

[2)] Università di Palermo, Palermo, Italy

*E-mail: kuznetsova.bess@mail.ru

Lanthanide ions are very well suited to use for down-conversion and up-conversion due to specialty of their energy levels structure (rich and ladder-like). In this context, Ln-doped inorganic phosphors are promising for practical important fields such as photonic, optoelectronic, sensing and photovoltaic. In this work we investigated spectral properties of Er^{3+} ions and excitation energy transfer mechanisms in host lattice Gd_2O_3.

Several excitation channels of Er^{3+} luminescence at 544 nm were observed: interband transitions, excitation by Gd^{3+} ions and intracenter excitation. Excitation of

Gd^{3+} ions indicates that such ions cannot be located at regular lattice positions and may be associated with intrinsic defects of host lattice Gd_2O_3. The mechanism of energy transfer from Gd^{3+} ions to Er^{3+} optical centers are offered and quantum efficiency of the Er^{3+} ions luminescence under intracenter excitation (η_1=0,5) and excitation by imperfect Gd^{3+} ions (η_2=0,4) are calculated. It is found that the most decay time of the Er^{3+} ions luminescence is observed under excitation by Gd^{3+} ions, however, the quantum efficiency in this case is less. It means that the major losses under indirect excitation take place at intermediate stages. So there is a reserve for minimizing these losses and the quantum efficiency of the Er^{3+} ions luminescence can be controlled by changes the defectiveness of host lattice Gd_2O_3.

ОСОБЕННОСТИ ЭФФЕКТИВНОЙ ПРОВОДИМОСТИ ТРЕХФАЗНЫХ МАТЕРИАЛОВ

Сачков И.Н.[1,2], Турыгина В.Ф.[1*], Маринова О.[3], Турыгин Е.Э.[1]

[1)] Уральский федеральный университет имени первого Президента России Б.Н. Ельцина, г. Екатеринбург, Россия
[2)] Екатеринбургская академия современного искусства, г. Екатеринбург, Россия
[3)] Экономический Университет Варны, Варна, Болгария.
*E-mail: v.f.volodina@urfu.ru

FEATURES OF EFFECTIVE CONDUCTIVITY OF THREE-PHASE MATERIALS

Sachkov I. N.[1,2], Turygina V. F.[1*], Marinova O.[3], Turygin.E.E.[1]

[1)] Ural Federal University, Yekaterinburg, Russia

[2)] Ekaterinburg Academy of Contemporary Art, Yekaterinburg, Russia

[3)] Varna University of Economics, Varna, Bulgaria

The vast majority of technical materials are multiphase. The wide experience of the description and forecasting of properties of two-phase materials is so far saved up. At the same time three-phase remains out of sight of researchers. The offered work is devoted to research of effective conductivity of the three-phase matrix materials characterized by the matrix structure with the inclusions of a round form surrounded with covers of the third phase.

Используется подход, основанный на применении метода конечных элементов с дискретизацией расчетной области треугольными симплекс-элементами [1]. Сетка разбиений адаптирована к форме включений. Алгоритмы расчетов реализованы в форме авторских программ на языке Фортран. В процессе расчетов варьировались концентрации включений и проводимости матрицы, включения и его оболочки.